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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/596,475	05/15/2007	Takaaki Hira	81707.0201	7023

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EXAMINER

SAN MARTIN, JAYDI A

ART UNIT	PAPER NUMBER
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2837

NOTIFICATION DATE	DELIVERY MODE
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06/16/2009

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/596,475	HIRA ET AL.	
	Examiner	Art Unit	
	Jaydi SanMartin	2837	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) 12-14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 15-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input checked="" type="checkbox"/> Other: <u>translations</u> . |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-11 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tsuda et al. (JP 2006-228866A).

Tsuda discloses a laminated piezoelectric device obtained by alternately laminating piezoelectric layers containing Pb (lead zirconate titanate, PZT **18**) and conducting layers (**13**, **17**), wherein the piezoelectric layer formed between the two conducting layers has layer regions (**16**) where metal ions are mixed together in interfacial portions thereof relative to said conducting layers.

However, Tsuda fails to disclose **(a)** the conducting layers comprising palladium (and specific materials as claimed in claims 6-8); **(b)** the metal ions comprising palladium and lead and **(c)** the interfacial layer regions having a thickness of 1- 3% of the thickness of said piezoelectric layer.

Regarding **(a)**, Tsuda discloses the use of metal ions formed between the electrode layer and the piezoelectric layer for the purpose of providing a piezoelectric actuator of excellent piezoelectric characteristics with improved adhesion between the piezoelectric layer and the electrode layer.

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Regarding (b), in paragraph 0039 of the provided machine translation, Tsuda discloses the use of palladium as one of the ions used in layer 16 and metals such as iridium, platinum and tungsten to form the electrode layers. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use palladium to form the electrodes since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding (c), Tsuda discloses the first conducting layer (15) having a thickness of 10-200 nm, the piezoelectric layer having a thickness of 0.2-5 μm . However, Tsuda is silent regarding the thickness of the interfacial layer. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only ordinary skill in the art. *In re Aller*, 105 USPQ 233. In the instant case, it would have been obvious to one of ordinary skill in the art to select a specific interfacial layer thickness as necessitated by the specific requirements of a particular application.

2. Regarding claims 9-12, the Examiner takes Official Notice that it is well known in the art to use piezoelectric ceramics containing voids (holes or bubbles) when these ceramics are subject to compression in a specific direction to perform its functions in a way that is significantly superior to what it would be without the voids. It would have been obvious to one of ordinary skill in the art to use a PZT ceramic with voids distributed in the claimed shape, size and specific locations as necessitated by the specific requirements of a particular application.

3. Regarding claims 16-21, Tsuda discloses the use of PZT layers in a crystal phase. The Examiner takes Official Notice that it is well known in the art to replace Pb and Zr/Ti with ions

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of W, Yb or other elements to improve the piezoelectric characteristics of the element.

Therefore, it would have been obvious at the time of the invention was made to have specific element species constituting the B-site being larger than 4 as necessitated by the specific requirements of a particular application.

Claim Rejections - 35 USC § 102

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 23 and 24 are rejected under 35 U.S.C. 102(b) as being anticipated by Watabiki Seiji (JP 11-145525).

Seiji discloses a laminated piezoelectric actuator comprising piezoelectric layers (4) containing Pb and conducting layers (2, 3) containing palladium (Ag/Pd alloy) as a conducting component, wherein the piezoelectric layer formed between the two conducting layers (see paragraphs 5 and 11 of the translation) has layer regions where Pb and Pd are mixed together in the interracial portion thereof relative to said conducting layers, and in the layer regions, Pd is present in the form of an alloy thereof with Pb. Please refer to page 11 of the provided translation (Advantage of the invention). Paragraph 14, explains that the part of the internal electrode layer is intruded in the ceramic layers.

Response to Arguments

5. Applicant's arguments filed 3/10/09 have been fully considered but they are not persuasive.

6. Similar to the present invention, Tsuda's invention provides a laminated piezoelectric device having large adhering strength between the piezoelectric layer and the electrode layer.

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7. In response to applicant's argument that Tsuda fails to teach or suggest the limitations (b) or (c) presented on page 8 of the Remarks, it is the Examiner's position that the Rejection was under 35 USC 103(a) and anticipation of all of the elements was not expected. However, it is the Examiner's position that the modifications are obvious modification in view of the teachings of Tsuda as explained above.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jaydi SanMartin whose telephone number is (571)272-2018. The examiner can normally be reached on M-Th 9-7.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Benson can be reached on 571-272-2227. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jaydi SanMartin/
Primary Examiner, Art Unit 2837

June 12, 2009